

Remarks/Arguments

Claims 1-17, 19-27, 29-31, 33-40 and 42-45 are pending in the application. Claims 1-17, 19-27, 29-31, 33-40 and 42-45 were rejected. Claims 1-9, 12-17 and 43 were rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 6,720,519 B2 (*Liu et al.*). Claims 10-11, 19-27, 29-31, 33-40, 42 and 44-45 were rejected under 35 U.S.C. §103(a) as being unpatentable over Liu ('519) and further in view of U.S. Patent No. 6,621,045 B1 (*Liu et al.*) and U.S. Patent Application Publication No. US 2002/0170891 A1 (*Boyle et al.*). No claims were listed as being objected to and no claims were allowed. No new matter is presented.

The Office Action is silent regarding the amendment to claim 19 presented in the January 17, 2007 amendment. Claim 19 was amended to overcome an objection under 35 U.S.C. §132(a) asserting that the July 28, 2006 amendment introduced new matter into the disclosure.

The Applicants thank the examiner for her time during a telephonic interview on May 15, 2007. Pursuant to the examiner's request, the Applicants request reconsideration of their previous arguments.

The Office Action states that, "Applicants arguments filed 1/22/07 have been fully considered but are not persuasive. Applicant did not have arguments with respect to the prior art and instant claims. Applicant must also discuss the references applied to the claims, explaining how the claims avoid the reference or distinguish from them."

The statement regarding arguments is incorrect. The January 17, 2007 amendment (received January 22, 2007) included a discussion regarding the new matter rejection and questioned why the same exact rejections made in the June 19, 2006 Office Action were repeated in the September 21, 2006 Office Action.

During a telephonic discussion in July 2006, the examiner said that if any amendments were made to the claims after final, new issues would be raised requiring a new prior art search. The Applicants filed an RCE and an Amendment Accompanying RCE on July 28, 2006. The presumption being that the amendments to the claims would raise new issues, necessitate a new search and provide new arguments from the examiner. However, even with claim amendments,

the same rejections were carried over in the September 21, 2006 Office Action without mentioning the claim amendments. Since the same claim rejections in the September 21, 2006 Office Action were identical to those in the January 24, 2007 Office Action and did not address the Applicants' arguments, the Applicants' stated that the previous arguments apply and provided a condensed version of their previous response.

Claim Rejections – 35 U.S.C §102

With respect to the rejection of claims 1-9, 12-17 and 43 under 35 U.S.C. §102(b) as being anticipated by Liu ('519), the Applicants respectfully disagree.

As stated in MPEP §2131, "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. Of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). "The identical invention must be shown in as complete detail as is contained in the...claim." *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Liu ('519) does not teach each and every element of claim 1. Liu ('519) teaches away from the present invention. Liu ('519) does not teach diagnostic feedback that measures an attribute of at least one of the laser pulses during the progress of the hole being drilled. In Liu ('519), alignment of his microfilter can only be performed by the operator of the laser system either prior to, or after a drilling operation. Not while drilling is in progress.

Liu ('519) teaches placing a large area CCD camera directly in his light path to perform sub-beam alignment (col. 12, lines 25-40). As can be seen in FIG. 3, when a CCD camera is placed in the position of image transfer lens 1150, the optical light path to the work piece 1155 is blocked. Drilling would be impossible until after the CCD camera is removed and the image transfer lens replaced. Therefore, Liu ('519) cannot provide diagnostic feedback to a computer means, wherein the diagnostic feedback measures an attribute of at least one of said laser pulses during the progress of a hole being drilled.

The present invention teaches using diagnostic feedback to adjust the laser while drilling is in progress. The feedback provides information pertaining to the laser beam's temporal characteristics, alignment, and power output, and these parameters are adjusted as drilling progresses.

Liu ('519) teaches an alignment method that is entirely different than what the present invention claims. Applicants respectfully submit that the elements clearly defined in claim 1 are not taught by Liu ('519) and that Liu ('519) therefore cannot anticipate the present invention.

Claim Rejections – 35 U.S.C. §103

With respect to the rejection of claims 10-11, 19-27, 29-31, 33-40, 42 and 44-45 under 35 U.S.C. §103(a) as being unpatentable over Liu ('519) and further in view of Liu ('045) and Boyle, the Applicants respectfully disagree.

As stated in MPEP §2143, “To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure.” *In re Vaeck*, 20 USPQ2d 1438 (Fed. Cir. 1991).

Mere identification in the prior art of each element is insufficient to defeat the patentability of the combined subject matter as a whole. It must be explained why one of ordinary skill in the art would have been motivated to select the references and combine them to render the claimed invention obvious. Applicants' arguments stress the lack of motivation-suggestion-teaching. Rejections based on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness. *Lee*.

In the September 21, 2006 Office Action, the examiner cited *in re Keller* to show that one cannot attack references individually when a rejection is based on a combination. The reason why each reference was discussed was to show their principle of operation and to show the lack of motivation to combine them to render the present invention obvious.

Liu ('045) discloses a system and method of using a prior art vacuum work piece holder in conjunction with a directed gas flow. Liu ('045) teaches balancing normal atmospheric pressure present under a flimsy work piece to be drilled against a deflection of a flimsy work

piece in the direction of laser beam travel caused by the laser beams impinging on the work piece. Liu ('045) teaches using a negative pressure above the flimsy work piece surface where the laser beams impinge by using a gas flow. The flow of air across the top surface of the flimsy work piece creates a low pressure area that negates the effects of the impinging laser beams and maintains a constant laser focal plane.

The present invention does not require or use the system disclosed in Liu ('045). The present invention teaches the use of an air-tight chamber amply sized to accommodate a large work piece, such as the turbine engine component claimed. The chamber is maintained at a near vacuum or purged using helium. The purpose of the part chamber and its internal environment as used in the present invention is not to compensate for deflections in flimsy work pieces that affect laser focus as in Liu ('045).

Boyle teaches a system of laser machining vias (a through-connection in a multi-layer printed circuit board (PCB) or integrated circuit (IC)) using a single pulsed laser beam and a "cleanroom chamber." The chamber is used to develop insulating, oxide linings for the vias.

The present invention requires no such attention to chemical reactions. Liu ('045) teaches the use of a gas flow to create a reduced pressure in front of the target area of the work piece and Boyle teaches pulsed laser machining of a substrate inside an environmentally controlled chamber. Boyle's use of his cleanroom is for an entirely different purpose.

Nowhere within Liu ('519) is a suggestion or motivation to provide feedback from a sensor to maintain laser beam alignment while drilling. Liu ('045) does not suggest a large chamber for holding a large work piece to be drilled in a complete, or near vacuum. Boyle does not suggest in his clean room chamber an alternative use for large work pieces and that a near vacuum or helium atmosphere is preferred when drilling metals or ceramics as in the present invention. It would not have been obvious to use the teachings of Liu ('519 and '045) and Boyle to arrive at the present invention considering that Liu ('519 and '045) and Boyle do not suggest the functions that the present invention performs. The motivation to combine the three references is a conclusory hindsight assertion. The combination of the three references would be ineffective to produce a laser drilling system that provides diagnostic feedback during the progress of a hole being drilled.

The Applicants believe that the above discussion is what the examiner desired in her request to discuss the references as applied to the claims, explaining how the claims avoid the reference or distinguish from them.

If the Examiner believes that a further telephonic interview will facilitate allowance of the claims, she is respectfully requested to contact the undersigned at 203-777-2268.

Accordingly, Applicants submit that claims 1-17, 19-27, 29-31, 33-40 and 42-45 are in condition for allowance.

Please charge any fees or deficiency or credit any overpayment to our Deposit Account of record.

Respectfully submitted,
Christopher J. Lehane *et al.*

By 

Timothy Lubecki
Attorney for Applicant
Reg. No.: 38,953

Telephone: 203-777-6628
Telefax: 203-865-0297

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I, Alicia Therriault, hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: "Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313" on July 6, 2007.



Alicia Therriault